Name Answer Key Algebra 2 CP Midterm Review 2013-2014

Unit 1

Real Numbers

Name the subset(s) of real numbers to which each of the following belongs.

1. 7 Q, I, W, N
2. –8 Q, I
3. 3 Q, I, W, N
4. –5.777777… Q
5. $\sqrt{5}$ Ir

Order of Operations

Simplify each numerical expression.

6. $8\times3+4\div2$ $24+2=26$
7. $3^4+2^3-5^2$ $81+8-25=89-25=64$
8. $9\div3-2+7-3\times4$ $3-2+7-12=1+7-12=8-12=-4$

Variables and Expressions

Evaluate each expression using the value given for each variable.

9. $\frac{3(2x+1)-2(x-3)}{x+6};x=-3$ $\frac{3(2(-3)+1)-2(-3-3)}{-3+6}=\frac{3(-6+1)-2(-6)}{3}=\frac{-15+12}{3}=-1$
10. $\frac{5(2k-3)-3(k+4)}{3k+2};k=-2$ $\frac{5(2(-2)-3)-3(-2+4)}{3(-2)+2}=\frac{5(-7)-3(2)}{-4}=\frac{-35-6}{-4}=\frac{+41}{4}$

Properties of Real Numbers

Name the property of real numbers illustrated by each of the following.

11. 92.5(1)=92.5 Identity Property of Mult.
12. $\pi(a+b)=\pi a+\pi b$ Distributive Property
13. –7 +4 = 4 + (-7) Commutative Property of Addition
14. $29\pi=\pi\bullet29$ Commutative Property of Mult
15. –5 +0 = -5 Identity Property of addition
16. (-8) + 8 = 0 Inverse Property of Addition

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Unit 2- Equations and Inequalities

Solve and check.

17. $4w - 2(1 - w) = -38$

$4w - 2 + 2w = -38$

$6w - 2 = -38$

$+2 \quad +2$

$\frac{6w}{6} = \frac{-36}{6}$

$w = -6$

Check

$4(-6) - 2(1+6) = -38$

$-24 - 14 = -38$

$-38 = -38$ ✓

18. $3(m - 2) - 5 = 8 - 2(m - 4)$

$3m - 6 - 5 = 8 - 2m + 8$

$3m - 11 = 16 - 2m$

$+2m \quad +2m$

$5m - 11 = 16$

$+11 \quad +11$

$\frac{5m}{5} = \frac{27}{5}$

$m = \frac{27}{5}$

19. $5(x - 2) - 4(x + 1) = 50$

$5x - 10 - 4x - 4 = 50$

$x - 14 = 50$

$+14 \quad +14$

$x = 64$

Check

$5(64-2) - 4(64+1) = 50$

$5(62) - 4(65) = 50$

$310 - 260 = 50$

$50 = 50$ ✓

20. $-5x + 3 = -12$

$-3 \quad -3$

$\frac{-5x}{-5} = \frac{-15}{-5}$

$x = 3$

Check

$-5(3) + 3 = -12$

$-15 + 3 = -12$

$-12 = -12$ ✓

21. $x - 5(x + 2) = 30$

$x - 5x - 10 = 30$

$-4x - 10 = 30$

$+10 \quad +10$

$\frac{-4x}{-4} = \frac{40}{-4}$

$x = -10$

Check

$-10 - 5(-10+2) = 30$

$-10 - 5(-8) = 30$

$-10 + 40 = 30$

$30 = 30$ ✓

22. Solve: $|3x + 2| = 10$

$3x + 2 = 10$ | $3x + 2 = -10$

$-2 \quad -2$ | $-2 \quad -2$

$\frac{3x}{3} = \frac{8}{3}$ | $\frac{3x}{3} = \frac{-12}{3}$

$x = \frac{8}{3}$ | $x = -4$

Check

$|3(\frac{8}{3}) + 2| = 10$

$|8 + 2| = 10$

$10 = 10$ ✓

$|3(-4) + 2| = 10$

$|-12 + 2| = 10$

$|-10| = 10$ $\quad 10 = 10$ ✓

23. Solve: $2|x - 1| + 3 = 7$

$-3 \quad -3$

$\frac{2|x-1|}{2} = \frac{4}{2}$

$|x - 1| = 2$

$x - 1 = 2$ | $x - 1 = -2$

$x = 3$ | $x = -1$

24. Solve: $|x - 5| - 2 = 10$

$|x - 5| = 12$

$x - 5 = 12$ | $x - 5 = -12$

$+5 \quad +5$ | $+5 \quad +5$

$x = 17$ | $x = -7$

Check

$|17 - 5| - 2 = 10$

$|12| - 2 = 10$

$12 - 2 = 10$

$10 = 10$ ✓

$|-7 - 5| - 2 = 10$

$|-12| - 2 = 10$

$12 - 2 = 10$

$10 = 10$ ✓

25. Graph the solution set of $-5(2x - 5) \geq 10$

$-10x + 25 \geq 10$

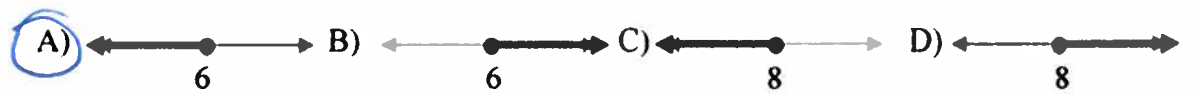
$-25 \quad -25$

$\frac{-10x}{-10} \geq \frac{-15}{-10}$

$x \leq \frac{3}{2}$ $\quad x \leq 1.5$

26. Graph the solution set for: $4(x - 7) \leq -4$

A) B) C) D)



$4x - 28 \leq -4$

$+28 \quad +28$

$\frac{4x}{4} \leq \frac{24}{4}$

$x \leq 6$

27. Solve: $2 < 3x + 2 < 5$

$-2 \quad -2 \quad -2$

$0 < 3x < 3$

$\frac{0}{3} < \frac{3x}{3} < \frac{3}{3}$

$0 < x < 1$

28. Graph the solution set of $x \leq 12$ or $x \geq 15$.

29. Solve: $4x - 2 \leq 14$ or $3x - 4 \geq -13$.

$\frac{4x}{4} \leq \frac{16}{4} \quad \frac{3x}{3} \geq \frac{-9}{3}$

$x \leq 4$ or $x \geq -3$

All Real Numbers

30. When solving absolute value inequalities, the first step is **never** to isolate the absolute value symbols.

A) True B) False

31. Solve: $|x + 3| \geq 21$

$x + 3 \geq 21$ { $x + 3 \leq -21$

$x \geq 18$ or $x \leq -24$

33. Solve: $2|x - 3| + 4 \leq 18$

$-4 \quad -4$

$\frac{2|x-3|}{2} \leq \frac{14}{2}$

$|x - 3| \leq 7$

$x - 3 \leq 7$ { $x - 3 \geq -7$

$x \leq 10$ and $x \geq -4$

32. Solve $|4x + 5| \leq 10$, graph the solution set.

$4x + 5 \leq 10$ and $4x + 5 \geq -10$

$4x \leq 5 \quad 4x \geq -15$

$x \leq \frac{5}{4}$ and $x \geq \frac{-15}{4}$

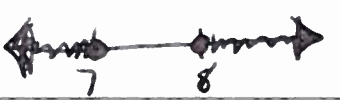
$x \leq 1\frac{1}{4}$ and $x \geq -3\frac{3}{4}$

34. Solve $|15 - 2x| \geq 1$ and graph the solution.

$15 - 2x \geq 1$ or $15 - 2x \leq -1$

$\frac{-2x}{-2} \geq \frac{14}{-2} \quad \frac{-2x}{-2} \leq \frac{-16}{-2}$

$x \leq 7$ or $x \geq 8$



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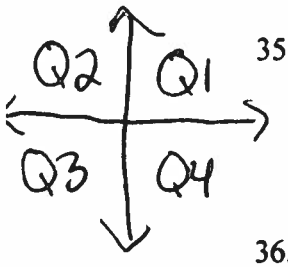
Unit 3 Graphing



35. The ordered pair (x, y) represents a point in a coordinate plane. Name the quadrant, point, or axis that satisfies the conditions $x < 0$ and $y < 0$.

A) Origin B) Quadrant II C) Quadrant III D) Quadrant IV

36. Is the ordered pair (7,2) a solution of x – y = –8? NO

$7 - 2 = -8$

$5 \neq -8$

37. Find an ordered pair, which is a solution of $2x + 3y = 6$.

A) (0,6) B) (0,2) C) (2,0) D) (6,0)

$2(0) + 3(6) = 6$ $2(0) + 3(2) = 6$ $2(2) + 3(0) = 6$ $2(6) + 3(0) = 6$

$18 \neq 6$ $0 + 6 = 6$ $4 \neq 6$ $12 \neq 6$

$6 = 6$ ✓

38. Find an ordered pair, which is a solution of $3x - 2y = 5$.

A) $(-3, 2)$ B) $(-3, -2)$ C) $(3, -2)$ D) (3,2)

$3(3) - 2(2) = 5$

$9 - 4 = 5$

$5 = 5$ ✓

39. Find the slope of the line passing through (3, 5) and (5, -2).

$m = \frac{y_2 - y_1}{x_2 - x_1}$

$= \frac{-2-5}{5-3} = \frac{-7}{2}$

40. Find the slope of the line passing through $(4, -1)$ and $(2, -3)$.

$m = \frac{-3+1}{2-4}$

$m = \frac{-2}{-2}$

$m = 1$

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41. Find the slope and y-intercept for $2y + 5x = -8$.

$\frac{2y}{2} = \frac{-5x}{2} - \frac{8}{2}$ $y = \frac{-5}{2}x - 4$ $m = \frac{-5}{2}$ $b = -4$

42. Find the slope and y-intercept for $y + 4x = 5$.

$y = -4x + 5$ $m = -4$ $b = 5$

43. Determine if the lines $y = \frac{1}{2}x - 4$ and $3y = 6x + 9$ are parallel, perpendicular, or neither.

$y = 2x + 3$

44. Determine if the lines $-2x + y = -1$ and $x + 2y = 6$ are parallel, perpendicular, or neither.

$y = 2x - 1$ $y = -\frac{1}{2}x + 3$

45. Determine if the lines passing through $(1,2),(2,5)$ and $(3,3),(6,4)$ are parallel, perpendicular, or neither.

$m = \frac{5-2}{2-1}$ $m = \frac{4-3}{6-3}$

$m = 3$ $m = \frac{1}{3}$

46. If a line is vertical then it must have a slope that is:

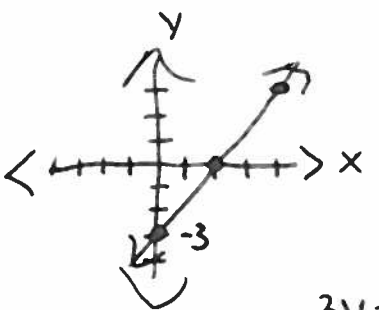
A) Positive B) Zero C) Undefined D) Negative

47. If a line is horizontal then it must have a slope that is:

A) Positive B) Zero C) Undefined D) Negative

48. Graph $-3x + 2y = -6$

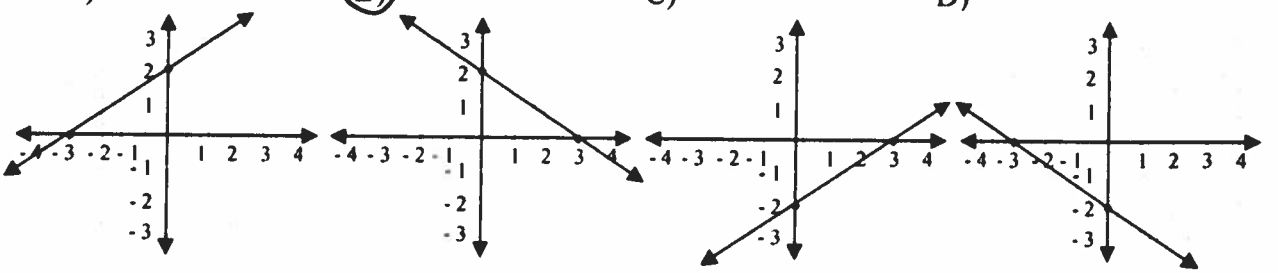
$y = \frac{3}{2}x - 3$



49. Which graph represents the equation $2x + 3y = 6$.

$-2x$ $-2x$ $\frac{3y}{3} = \frac{-2x}{3} + \frac{6}{3}$ $y = -\frac{2}{3}x + 2$

A) B) C) D)



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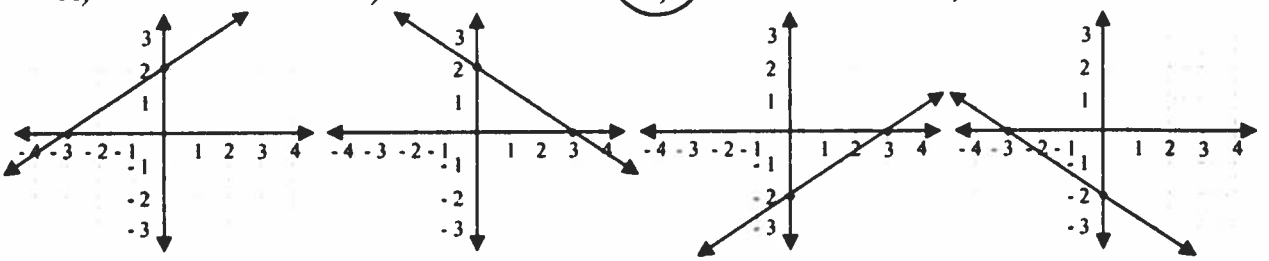
50. Which graph represents the equation $-4x+6y=-12$. $y=\frac{2}{3}x-2$

A) B) C) D)



51. Write the slope-intercept form of the equation of the line that has $m=\frac{1}{2}$ and contains $(0,3)$.

$y=\frac{1}{2}x+3$

52. Write the slope-intercept form of the equation of the line that has $m=4$ and contains (-1,3).

$y-y_1=m(x-x_1)$
$y-3=4(x+1)$
$y-3=4x+4$
$y=4x+7$

53. Write the slope-intercept form of the equation of the line that passes through (-1,5) and (-2,3).

$m=\frac{3-5}{-2+1}=\frac{-2}{-1}=2$

$y-y_1=m(x-x_1)$
$y-5=2(x+1)$
$y-5=2x+2$
$y=2x+7$

54. Write the standard form of the equation of the line, whose slope is $\frac{2}{3}$ and passes through (3,4).

$y-4=\frac{2}{3}(x-3)$
$3(y-4=\frac{2}{3}x-6)$
$3y-12=2x-18$
$+12 \quad +12$
$3y=2x-6$
$-2x+3y=-6$
$2x-3y=6$

55. Write the standard form of the equation of the line that passes through $(6,2)$ and $(1,-3)$.

$m=\frac{-3-2}{1-6}=\frac{-5}{-5}=1$

$y-2=1(x-6)$
$y-2=x-6$
$y=x-4$
$-1(-x+y=-4)$
$x-y=4$

56. Write the equation of the line, which is parallel to $y=2x+1$ and has a y-intercept of -3.

$y=2x-3$

57. Write the equation of the line, which is perpendicular to $y=2x-1$ and has a y-intercept of -2.

$y=-\frac{1}{2}x-2$

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Unit 6 Polynomials

Add or subtract:

58. $(8x^2y+12xy^2-15xy+21)+(27x^2y+13xy^2-21xy-17)$

$35x^2y+25xy^2-36xy+4$

59. $(7x^3+9x^2-8x+11)-(5x^3-13x-16)$

$2x^3+9x^2+5x+27$

Simplify and write with positive exponents:

60. $(2x^{-4}y^2)^3$ $2x^{-12}y^6 = \frac{2y^6}{x^{12}}$

61. $(4x^{-2})^2(x^{-2})^4 = (16x^{-4})(x^{-8}) = 16x^{-12} = \frac{16}{x^{12}}$

62. $\frac{3x^{-4}y^{-3}}{9xy^3} = \frac{1}{3x^5y^6}$

63. $\frac{2x^{-4}y^{-3}}{4x^2y^{-2}} = \frac{1}{2x^6y}$

Mulitply:

64. $(4x+5)^2 = (4x+5)(4x+5) = 16x^2+40x+25$

65. $(3x-11)(x-6) = 3x^2-18x-11x+66 = 3x^2-29x+66$

66. $(5x-17)(x+2) = 5x^2+10x-17x-34 = 5x^2-7x-34$

67. $(2a-5)(4a^2+7a-3) = 8a^3+14a^2-6a-20a^2-35a+15$

$= 8a^3-6a^2-41a+15$

Divide:

68. $(x^3+4x^2+x-6)\div(x+3)$

$-3 \mid 1\ 4\ 1\ -6$

$-3\ -3\ 6$

$1\ 1\ -2\ 0$

x^2+x-2

69. $(8x^3+12x^2+6x+1)\div(2x+1)$

$4x^2+4x+1$

$2x+1 \mid 8x^3+12x^2+6x+1$

$-8x^3+4x^2$

$8x^2+6x$

$-8x^2+4x$

$2x+1$

$+2x+1$

0

70. Divide: $\frac{2x^3-1}{x+1}$

$-1 \mid 2\ 0\ 0\ -1$

$-2\ 2\ -2$

$2\ -2\ 2\ -3$

$2x^2-2x+2-\frac{3}{x+1}$

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Unit 4 Radicals

Simplify:

71. $\sqrt{32} = \sqrt{16 \cdot 2} = 4\sqrt{2}$

72. $\sqrt{54} = \sqrt{9 \cdot 6} = 3\sqrt{6}$

73. $\sqrt[3]{80n^5} = \sqrt[3]{8 \cdot 10n^5} = 2n\sqrt[3]{10n^2}$

74. $3\sqrt{7x^3} \cdot 2\sqrt{21x^3y^2} = 6\sqrt{147x^6y^2} = 42x^3y\sqrt{3}$ see #82

75. $4\sqrt{2x} \cdot 5\sqrt{6xy^2} = 20\sqrt{12x^2y^2} = 40xy\sqrt{3}$

76. $\frac{\sqrt{x}}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2x}}{2}$

77. $(4-2\sqrt{3})(4+2\sqrt{3}) = 16+8\sqrt{3}-8\sqrt{3}-4\sqrt{9} = 16-4(3) = 16-12 = 4$

78. $6\sqrt{18}+3\sqrt{50} = 18\sqrt{2}+15\sqrt{2} = 33\sqrt{2}$

79. $\frac{4}{1+\sqrt{3}} \cdot \frac{(1-\sqrt{3})}{(1-\sqrt{3})} = \frac{4-4\sqrt{3}}{1-3} = \frac{4-4\sqrt{3}}{-2} = -2+2\sqrt{3}$

80. $\sqrt{98} = \sqrt{49 \cdot 2} = 7\sqrt{2}$

81. $\sqrt[3]{27x^{81}y^{12}} = 3x^{27}y^4$

82. $3\sqrt{7x^3} \cdot 2\sqrt{21x^3y^2} = 6\sqrt{147x^6y^2} = 6\sqrt{49 \cdot 3x^6y^2} = 42x^3y\sqrt{3}$

83. $\frac{\sqrt{96}}{\sqrt{8}} = \sqrt{\frac{96}{8}} = \sqrt{12} = \sqrt{4 \cdot 3} = 2\sqrt{3}$

84. $\frac{\sqrt{3xy^2}}{\sqrt{5xy^3}} \sqrt{\frac{3xy^2}{5xy^3}} = \sqrt{\frac{3}{5y}} = \frac{\sqrt{3}}{\sqrt{5y}} \cdot \frac{\sqrt{5y}}{\sqrt{5y}} = \frac{\sqrt{15y}}{5y}$

85. Multiply: $(4-2\sqrt{3})(4+2\sqrt{3})$ same as 77

86. Add: $5\sqrt{27} - 4\sqrt{48} - \sqrt{75}$

$15\sqrt{3} - 16\sqrt{3} - 5\sqrt{3} = -1\sqrt{3} - 5\sqrt{3} = -6\sqrt{3}$

87. Rationalize: $\frac{3+\sqrt{5}}{1-\sqrt{5}} \cdot \frac{(1+\sqrt{5})}{(1+\sqrt{5})} = \frac{3+3\sqrt{5}+\sqrt{5}+5}{1-5} = \frac{8+4\sqrt{5}}{-4} = -2-\sqrt{5}$

88. Rationalize: $\frac{3+\sqrt{7}}{2-\sqrt{7}} \cdot \frac{(2+\sqrt{7})}{(2+\sqrt{7})} = \frac{6+3\sqrt{7}+2\sqrt{7}+7}{4-7} = \frac{13+5\sqrt{7}}{-3}$

Unit 7 Factoring Polynomials

Factor Completely:

89. $9x^2 - 36$ $(3x+6)(3x-6) = 3(x+2)\,3(x-2) = 9(x+2)(x-2)$

90. $x^2 - 16$ $(x+4)(x-4)$

91. $4x^2 - 169$ $(2x+13)(2x-13)$

92. $25x^2 - 40xy + 16y^2$ $(5x-4y)(5x-4y)$

93. $x^2 + 10x - 75$ $(x+15)(x-5)$

94. $16x^2 - 9y^2$ $(4x-3y)(4x+3y)$

95. $25x^2 + 36y^2$ Not factorable (Prime)

96. $12x^2 - 16x - 35$

97. $3x^2 + 24x + 45$ $3(x^2+8x+15) = 3(x+3)(x+5)$

98. $8x^3 + 27y^3$ $(2x+3y)(4x^2-6y+9y^2)$

99. $2x^2 + 11x + 12$ $(2x^2+8x)(3x+12) = (x+4)(2x+3)$

100. $4a^2 + ab - 15b^2$

101. $d^3 + 64$ $(d+4)(d^2-4d+16)$

102. $k^4 - 1$ $(k^2+1)(k^2-1) = (k^2+1)(k+1)(k-1)$

103. $2ms + 3mt - 4ns - 6nt$

$(2ms-4ns)(+3mt-6nt)$

$2s(m-2n)\,3t(m-2n)$

$(2s+3t)(m-2n)$